Testing Laboratory 3787

RADIO EXPOSURE TEST REPORT

FCC ID	:	MSQ-RTAXI600
Equipment	:	Wireless-AX5700 Dual-band Gigabit Router
Brand Name	:	ASUS
Model Name	:	RT-AX86U/RT-AX5700/RT-AX86S
Applicant	:	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan
Manufacturer (1)	:	Compal Networking(KunShan) CO., LTD. No.520,Nan Bang RD., Economic & Technical Development Zone, KunShan,JiangSu,China
Manufacturer (2)	:	ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD. Ba Thien Industrial Park, Ba Hien commune, Binh Xuyen district, Vinh Phuc Province
Manufacturer (3)	:	ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD. No. D4-5-6, Thang Long Industrial Park (Vinh Phuc), Thien Ke commune, Binh Xuyen district, Vinh Phuc province, Vietnam
Standard	:	47 CFR Part 2.1091

The product was received on Dec. 05, 2019, and testing was started from Dec. 05, 2019 and completed on Sep.08, 2020. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FA9D0510-06	01	Initial issue of report	Jul. 16, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Vicky Huang

1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	**Frequency Range (MHz)**	**Operating Frequency (MHz)**	**Modulation Type**
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

1.2 Antenna Information

Set	Ant.	Port		Brand	P/N	Type	Connector	Antenna Gain (dBi)				
		2.4 GHz	5 GHz					2.4GHz	5GHz Band 1	5GHz Band 2	5GHz Band 3	5GHz Band 4
1	1	1	1	WHA YU	C660-510490-A	Dipole	Reversed-SMA	1.66	1.86	1.86	1.90	1.84
	2	2	3									
	3	3	4									
	4	-	2	WHA YU	C660-510390-A	PCB	I-PEX	-	2.90	2.90	3.00	2.52
2	1	-	-	WHA YU	C660-510492-A	Dipole	Reversed-SMA	1.52	1.41	1.45	1.72	1.74
	2	-	-									
	3	-	-									
	4	-	-	WHA YU	C660-510390-A	PCB	I-PEX	-	2.90	2.90	3.00	2.52
3	1	-	-	WHLSIN	RFDPA141500 SBLB802	Dipole	Reversed-SMA	1.52	1.66	1.76	1.82	1.65
	2	-	-									
	3	-	-									
	4	-	-	WHLSIN	RFPCA302603I M5B301	PCB	I-PEX	-	2.17	2.30	2.20	2.49

Set	Directional Gain (dBi)					
	2.4GHz	5GHz Band 1	5GHz Band 2	5GHz Band 3	5GHz Band 4	
	Nss1	Nss1	Nss1	Nss1	Nss1	Nss2
1	6.43	6.63	6.63	6.67	6.61	4.85

Note1: The above information was declared by manufacturer.

Note2: The EUT has three sets of antenna, and each set contains four antennas.

For 2.4GHz function (3TX/3RX):

Only the higher gain antenna “Set 1” was tested.

Port 1, Port 2 and Port 3 could transmit/receive simultaneously.

For 5GHz function (4TX/4RX):

Only the higher gain antenna “Set 1” was tested.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

Note3: 5GHz Band with four antennas and device designed the three dipole antennas are used in the vertical position, the other one PCB antenna is used in the horizontal position.

So array gain only calculation 10log(3).

1.3 Table for EUT Supports Functions

Function	Support Type
AP Router	Master
Bridge	Client without radar detection
Repeater	Master
Mesh	Master

1.4 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Model Name	Description
RT-AX86U	There is nothing different of three model names, just for different marketing use
RT-AX5700	
RT-AX86S	

Note 1: From the above models, model: RT-AX86U was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

1.5 Table for SKU Listing

The SKUs which are identical to each other in all aspects except for the following table:

EUT	LED Light PCB Board	Heat sink	2.4G FEM	2.5G PHY	RJ-45 cable	PU	USB port	2.5G RJ-45 port	Quantity of DDR memory	Adapter
SKU 1	V	V	Qorvo/ QPF4216B	BROADCOM/ BCM54991ELB0KFEBG	non-shielding	BCM4908	USB 3.0*2	V	2	1~3
SKU 2	V	V	SKYWORKS/ SKY85331-11	BROADCOM/ BCM54991ELB0KFEBG	non-shielding	BCM4908	USB 3.0*2	V	2	1~3
SKU 3	V	V	Qorvo/ QPF4216B	Realtek/ RTL8221B-VB-CG	non-shielding	BCM4908	USB 3.0*2	V	2	1~3
SKU 4	V	V	SKYWORKS/ SKY85331-11	Realtek/ RTL8221B-VB-CG	non-shielding	BCM4908	USB 3.0*2	V	2	1~3
SKU 5	X	V	Qorvo/ QPF4216B	X	non-shielding /Shielding	BCM4906	USB 3.0*1 USB 2.0*1	X	1	3~5

Note: The above information was declared by manufacturer.

1.6 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FA9D0510-02

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding a new model name: RT-AX86S. 2. Changing Applicant address to “1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan” from “1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan” 3. Adding the Manufacturer (3) information. 4. Adding SKU 3, SKU 4, SKU5 (Please refer to section 1.5 for detailed information). 5. Adding RJ-45 cable (Shielding) 6. Adding adapter 4 and adapter 5.	It does not affect the test results.

Note: All test results were based on original report.

1.7 Accessories

Accessories				
Equipment Name	**Brand Name**	**Model Name**	**Rating**	**Remark**
Adapter 1	DELTA	ADP-45ZE B	INPUT: 100-240V ~ 50-60Hz, 1.2A OUTPUT: 19V, 2.37A	With the DC cable: Non-shielded, 1.8m
Adapter 2	DELTA	ADP-45FE F	INPUT: 100-240V ~1.2A, 50-60Hz OUTPUT: 19V, 2.37A	With the DC cable: Non-shielded, 1.5m
Adapter 3	AcBel	ADH011	INPUT: 100-240V ~1.4A, 50-60Hz OUTPUT: 19.5V, 2.31A, 45W MAX	With the DC cable: Non-shielded, 1.5m
Adapter 4	LEI	MU36B1120300-A1	INPUT: 100-240V~50/60Hz，1A OUTPUT: 12V, 3A	-
Adapter 5	APD	WA-36N12FU	INPUT: 100-240V~,50-60Hz, 0.9A Max. OUTPUT: 12.0V, 3.0A	-
Others				
Power cable*1: Non-shielded, 0.9m for Adapter 1~3 use				
RJ-45 cable*1: Non-shielded, 1.5m				
RJ-45 cable*1: Shielded, 1.5m				

1.8 Testing Location

Testing Location Information	
Test Lab.：Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 26 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 \times P \times G}{377 \times d^2}$

2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)
2.4G;D1D	6.43	29.51	35.94	0.05	35.99	3.97192	26	0.46757	1.00000
5.2G;D1D	6.63	29.35	35.98	0.01	35.99	3.97192	26	0.46757	1.00000
5.3G;D1D	6.63	23.32	29.95	0.04	29.99	0.99770	26	0.11745	1.00000
5.6G;D1D	6.67	23.29	29.96	0.03	29.99	0.99770	26	0.11745	1.00000
5.8G;D1D (Nss1)	6.61	29.33	35.94	0.05	35.99	3.97192	26	0.46757	1.00000
5.8G;D1D (Nss2)	4.85	29.37	34.22	0.5	34.72	2.96483	26	0.34901	1.00000

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz + WLAN 5GHz

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)	Ratio (S/Limit)
2.4G;D1D	6.43	29.51	35.94	0.05	35.99	3.97192	26	0.46757	1.00000	0.46757
5.2G;D1D	6.63	29.35	35.98	0.01	35.99	3.97192	26	0.46757	1.00000	0.46757
									Sum Ratio	0.93514
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

THE END